FIG. 1

FIG. 2

901 902 903 904 905 906

FIG. 3

80cm

(NEAREST)

3m

∞

FOCUS COMPENSATION LENS POSITION

(INFINITE)

(WIDE END) ←→ (TELEPHOTO END)

FOCAL LENGTH
(MAGNIFICATION
LENS POSITION)

FIG. 4

FIG. 5

$$a_x = a_k - \frac{(z_k - z_{k-1})(a_k - a_{k-1})}{(z_k - z_{k-1})}$$

$$b_x = b_k - \frac{(z_k - z_x)(b_k - b_{k-1})}{(z_k - z_{k-1})}$$

FIG. 6

| FIG. 6A | FIG. 6B |

FIG. 6A

TO FIG. 6B

LENS MICROCOMPUTER

116

AF

COMPUTER ZOOM

LENS CAM DATA

116b

116d

116c

116a

MOTOR CONTROL

MOTOR DRIVER 111

Mo 110

105
104
103
102
101

112

106
113
113a
113b

MOTOR DRIVER 107

IRIS DRIVER 109

IG 108

115

114

LENS UNIT

100

FIG. 6B

FIG. 7A

FIG. 7

FIG. 7A	FIG. 7B

CAMERA SIGNAL
PROCESSING CIRCUIT

R — A/D [301] — ▷ [304]

G — A/D [302] — ▷ [305] — (+) [307] S5

B — A/D [303] — ▷ [306]

GAMMA [308] S6 — TE LPF [309] S7 — HPF [311][312] — ABS [313] S9

FE LPF [310] S8 — Line E/O

TO FIG. 7B

FRAME GENERATION [349] — L C R

TO LENS

MICROCOMPUTER [216]

INTERRUPTION SIGNAL

MICROCOMPUTER I/F [348]

FIG. 7B

L   C   R

314 Peak L   Peak C   Peak R   316

315   318

317 Buf   Buf   Buf   319

Y   Peak Hold

L   C   R   321

320 Peak L   Peak C   Peak R   322

Peak Select

323 Buf   Buf   Buf
324   325

TE/FE Peak Hold

329   330   331   332

FROM FIG.18A

L C R   L   C   R   L   C   R

Line Peak   Int. TEL   Int. TEC   Int. TER   Int. FEL   Int. FEC   Int. FER

327   328   334   335   336   337   338

326

333 Buf   Buf   Buf   Buf   Buf   Buf   Buf

TE Line Peak Sum   FE Line Peak Sum

339 Line Max.   342   L   C   R

341   — S10   Peak L   Peak C   Peak R   344

+   346   343

345 Buf   Buf   Buf   347

Line Min.

340

348   Max-Min

FIG. 8

⟶ EVEN FIELD SCANNING

⟶ ODD FIELD SCANNING

LINE

ODD FE

EVEN TE

ODD FE

EVEN TE

ODD FE

L
FRAME

C
FRAME

R
FRAME

FRAME

FRAME

FRAME

LR1

CR1

RR1

IR1
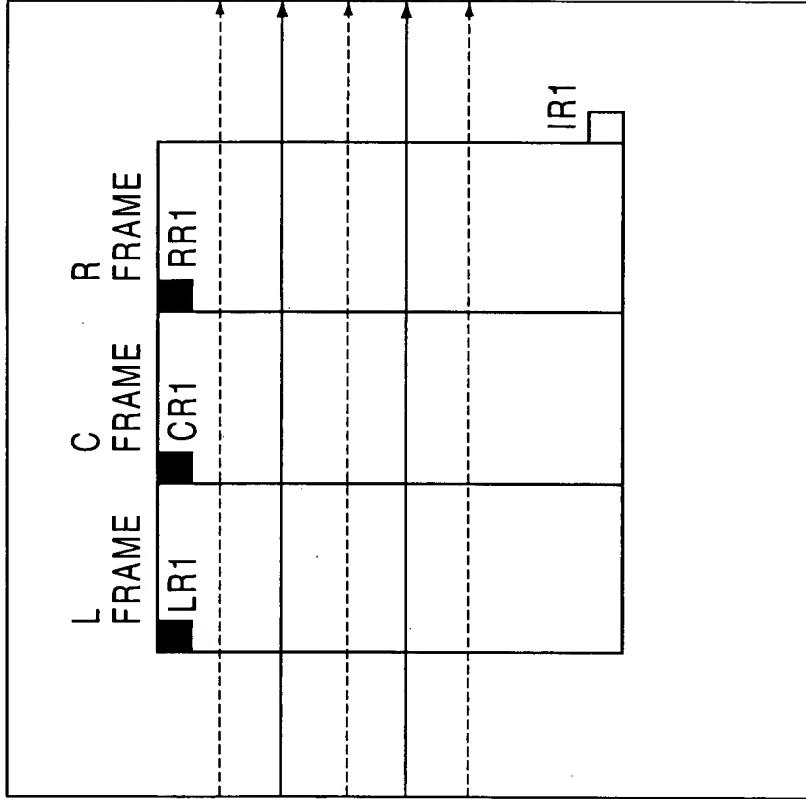
■ RESET OF INTEGRATION CIRCUIT, PEAK-HOLD CIRCUIT

□ TRANSFER OF DATA TO BUFFER, GENERATION OF IRQ

FIG. 9

```
┌──────────────────────────────┐
│            START             │──────  S1
└──────────────────────────────┘
               │
               ▼
┌──────────────────────────────┐
│   HILL-TOP CLIMBING          │
│   CONTROL                    │──────  S2
│   (SPEED, DIRECTION          │
│   CONTROL)                   │
└──────────────────────────────┘
               │
               ▼
┌──────────────────────────────┐
│      TOP DISCRIMINATION      │──────  S3
└──────────────────────────────┘
               │
               ▼
┌──────────────────────────────┐
│    WAITING FOR RESTART       │──────  S4
└──────────────────────────────┘
               │
               ▼
┌──────────────────────────────┐
│          RESTART             │──────  S5
└──────────────────────────────┘
```

FIG. 10

S101 — START

S102 — ROTATION FLAG = 0 ?

NO →

S104 — C0 ← C0 + 1
T2 ← TIMER VALUE

S105 — ΔT ← (T2 − T1)/C0

YES ↓

S103 — ROTATION FLAG = 1
C0 ← 0
T1 ← TIMER VALUE

S106 — 113a OUTPUT = H ?

NO → S108 — 113b OUTPUT = L ?

NO → TO S109

YES ↓

S107 — 113b OUTPUT = L ?

NO → YES

YES ↓

S109 — RING FLAG = 1

S110 — RING FLAG = 0

S111 — END

FIG. 11

```
                    ┌──────────────┐
                    │    START     │────── S121
                    └──────┬───────┘
                    ┌──────┴───────┐
                    │ COMMUNICATION │────── S122
                    └──────┬───────┘
                           │
                  ╱────────┴────────╲        NO
                 ╱    ROTATION        ╲─────────────────┐
                 ╲    FLAG = 1 ?      ╱                  │
                  ╲────────┬────────╱ ── S123            │
                           │ YES                   ╱─────┴──────╲    NO
                  ╱────────┴────────╲     NO      ╱  SW214=STOP? ╲──────┐
          ┌──────╲     C0 = 0 ?     ╱            ╲              ╱       │
          │       ╲────────┬────────╱ ── S124     ╲────┬───────╱       │
          │ NO             │ YES                       │ YES           │
    S125  │       ╱────────┴────────╲    YES           │         ╱─────┴─────╲  NO
          │      ╱    T1 − T2 > α ?  ╲───────┐         │        ╱ SW214=WIDE? ╲────┐
          │      ╲────────┬────────╱         │         │        ╲            ╱    │
          │               │ NO               │         │         ╲───┬──────╱ S134│
          │      ┌────────┴────────┐ S126     │         │             │ YES       │
          │      │  ΔT ← T1 − T2    │          │         │             │           │
          │      └────────┬────────┘          │         │          TO S131    TO S132
          └───────────────┤                   │         │
          ┌───────────────┴────────┐          │    ┌────┴──────┐
          │        Zspmax*ΔTmin     │          │    │ ZOOM STOP │──── S135
          │  Zsp ← ───────────────  │          │    └────┬──────┘
          │            ΔT           │          │         │
          └───────────────┬────────┘          │         │
    S127                   │                   │         │
                  ╱────────┴────────╲    NO     │         │
                 ╱  RING FLAG = 1 ?  ╲──────────┼─────┐   │
                 ╲────────┬────────╱            │     │   │
    S128                  │ YES                 │     │   │
    ┌─────────────────────┼──────────────────────────┼───┼─────────────┐ S138
    │ S129        ╱───────┴───────╲   NO   S130 ╱────┴───┴────╲   NO    │
    │            ╱   SW114 = H ?   ╲──────────╲─╱  SW114 = H ? ╲────────→ TO S131
    │            ╲───────┬───────╱             ╲──────┬──────╱          │
    │ S131               │ YES         S132            │ YES            │
    │        ┌───────────┴──────────┐      ┌───────────┴──────────────┐ │
    │        │ DRIVE TO WIDE SIDE   │      │ DRIVE TO TELEPHOTO SIDE  │ │
    │        └───────────┬──────────┘      └───────────┬──────────────┘ │
    └────────────────────┼──────────────────────────────┼──────────────┘
                ┌────────┴───────────────────────────────┘
                ┌────────┴────────┐
                │ ROTATION FLAG = 0 │──── S136
                └────────┬────────┘
                    ┌────┴─────┐
                    │   END    │──── S137
                    └──────────┘
```

FIG. 12

FIG. 13

OUTPUT
SIGNAL

TIME REQUIRED TO MOVE 112a
BY ONE GEAR TOOTH (HALF PERIOD)
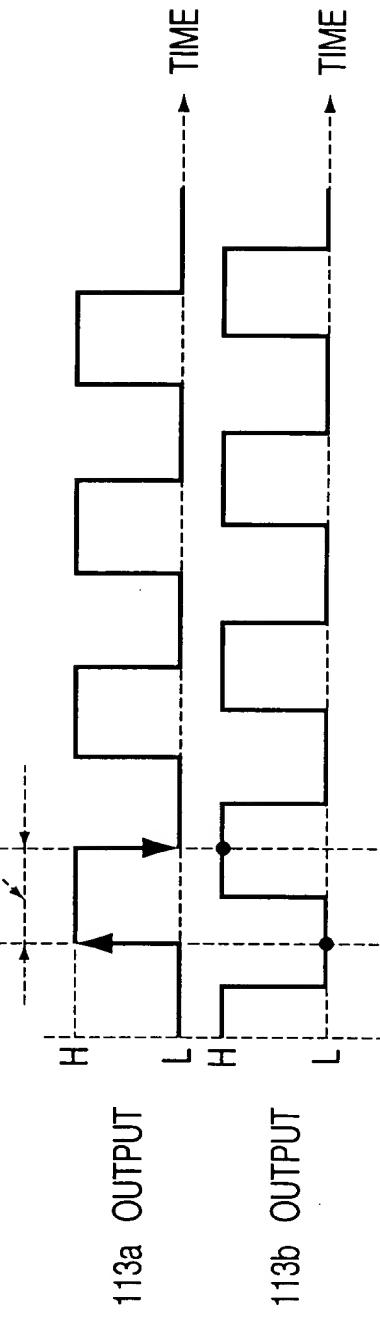
113a OUTPUT

113b OUTPUT

FIG. 14A

113a OUTPUT

113b OUTPUT

FIG. 14B
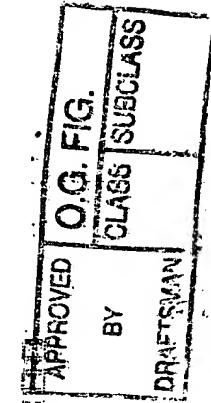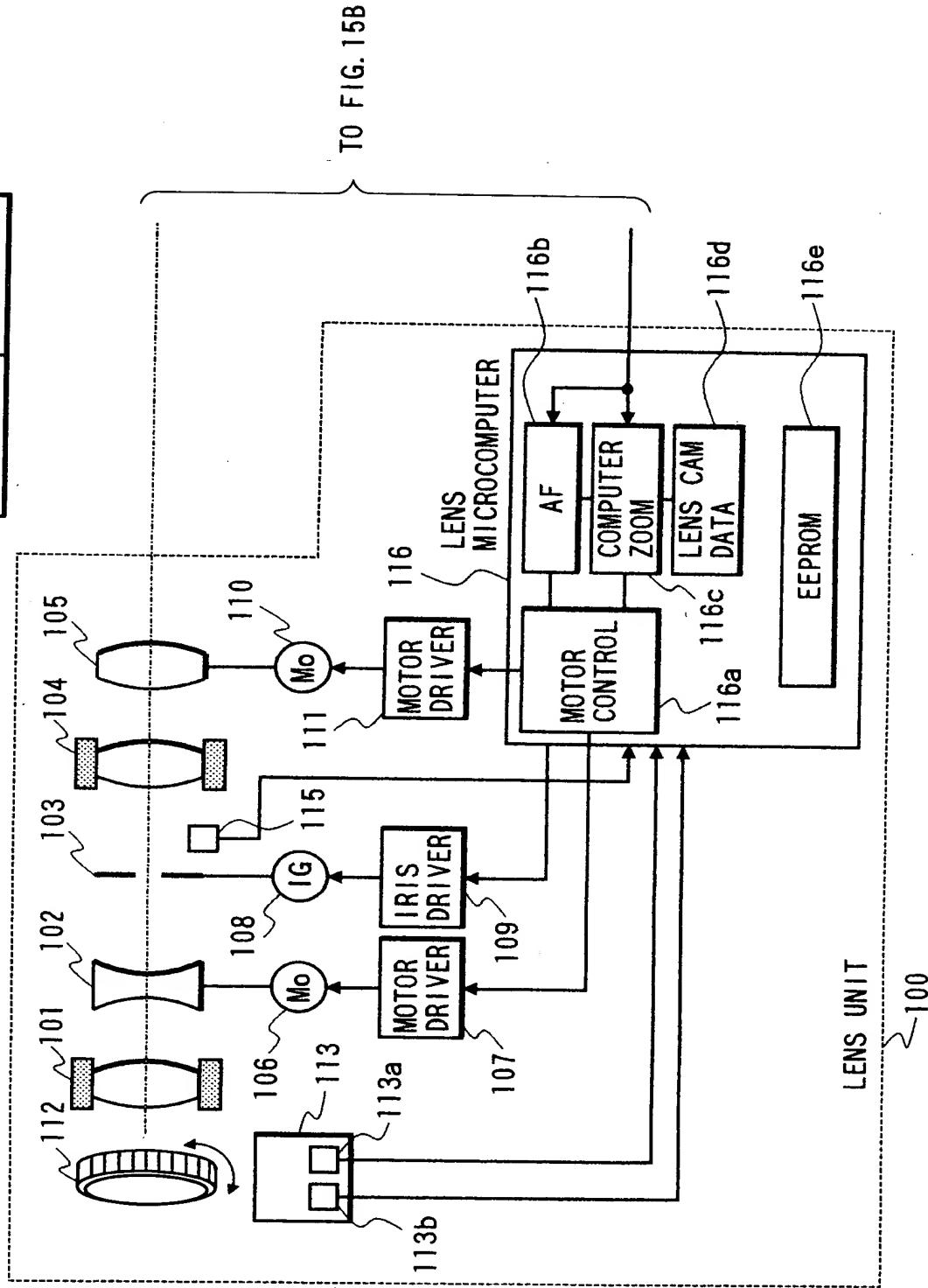
FIG. 15
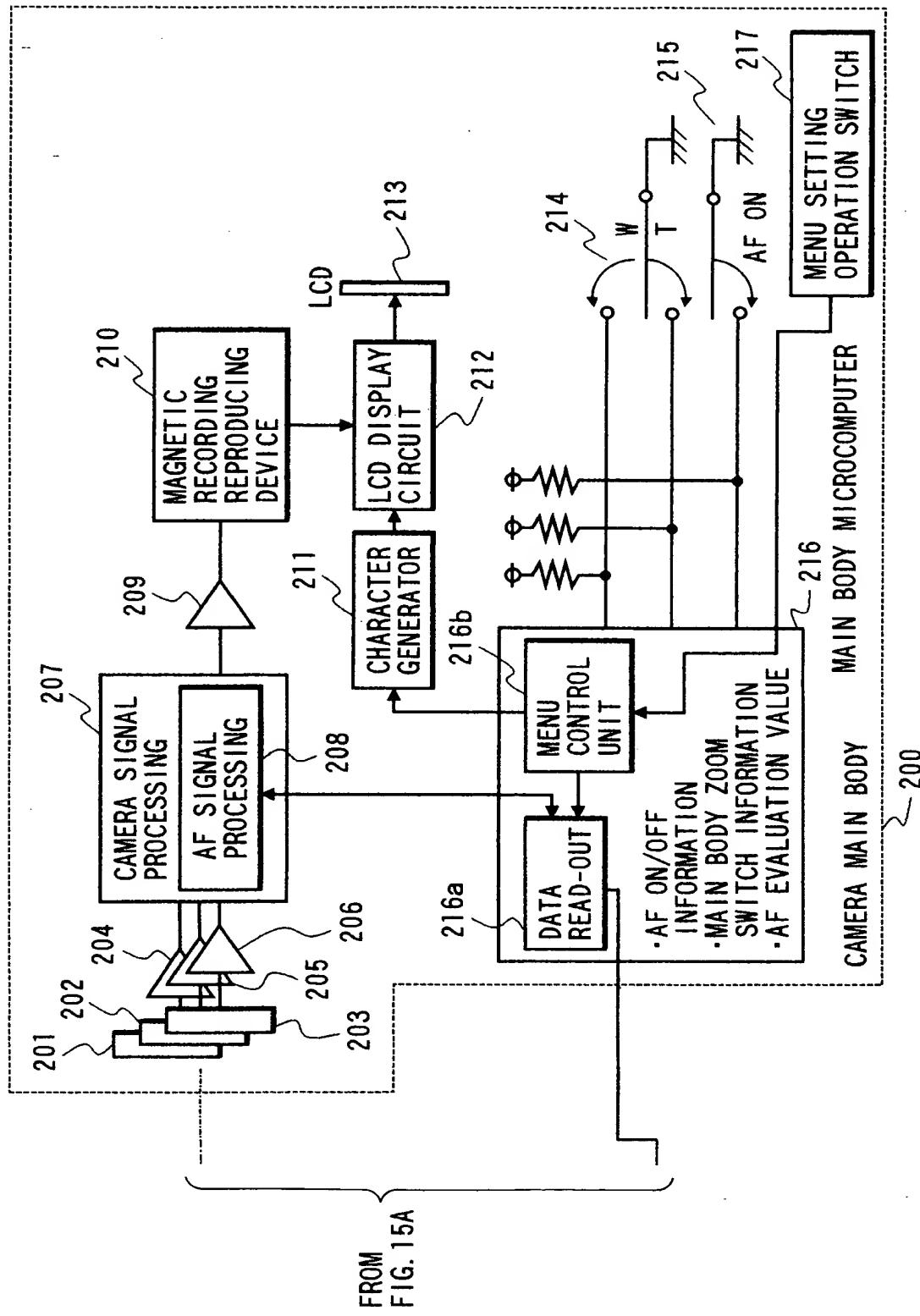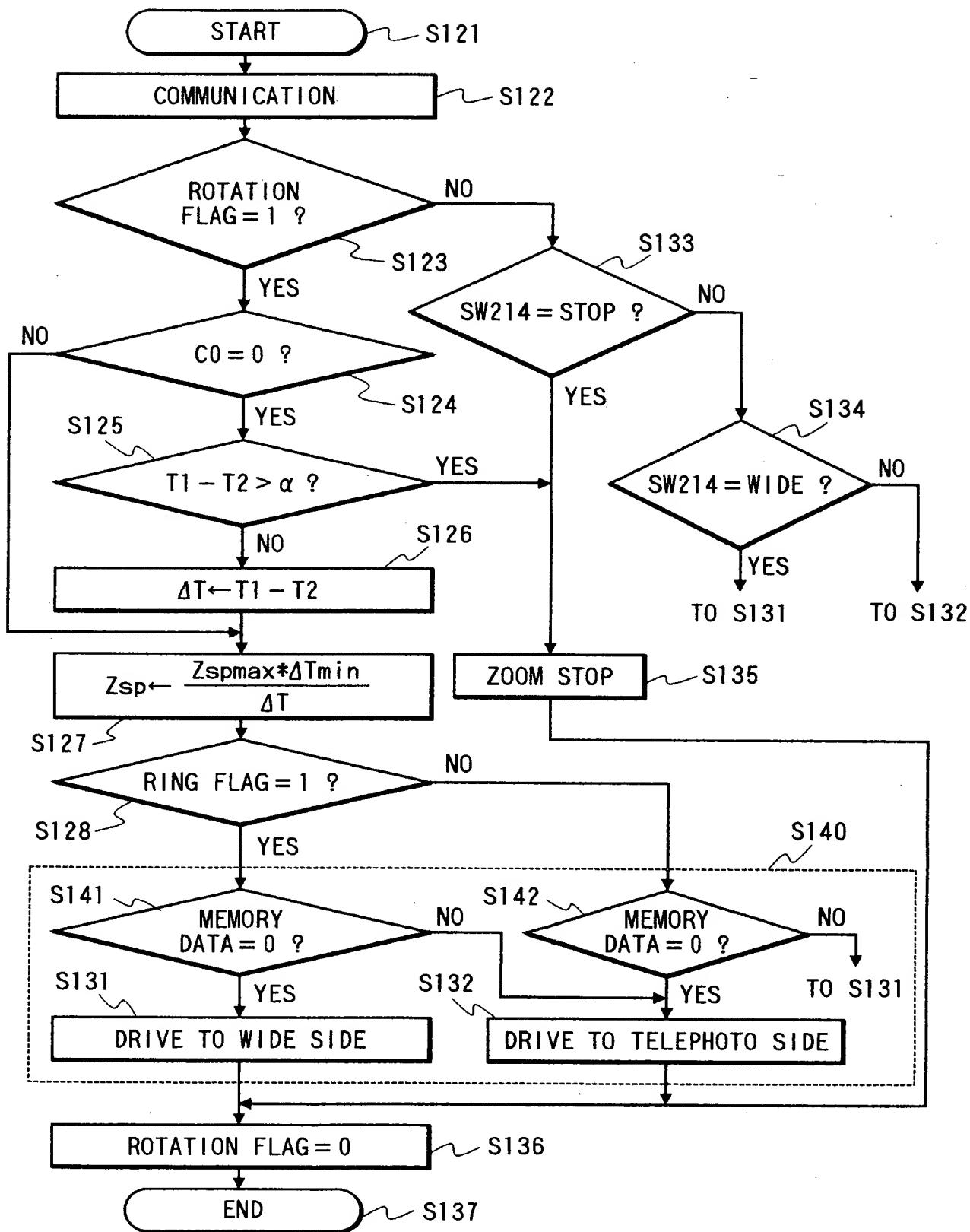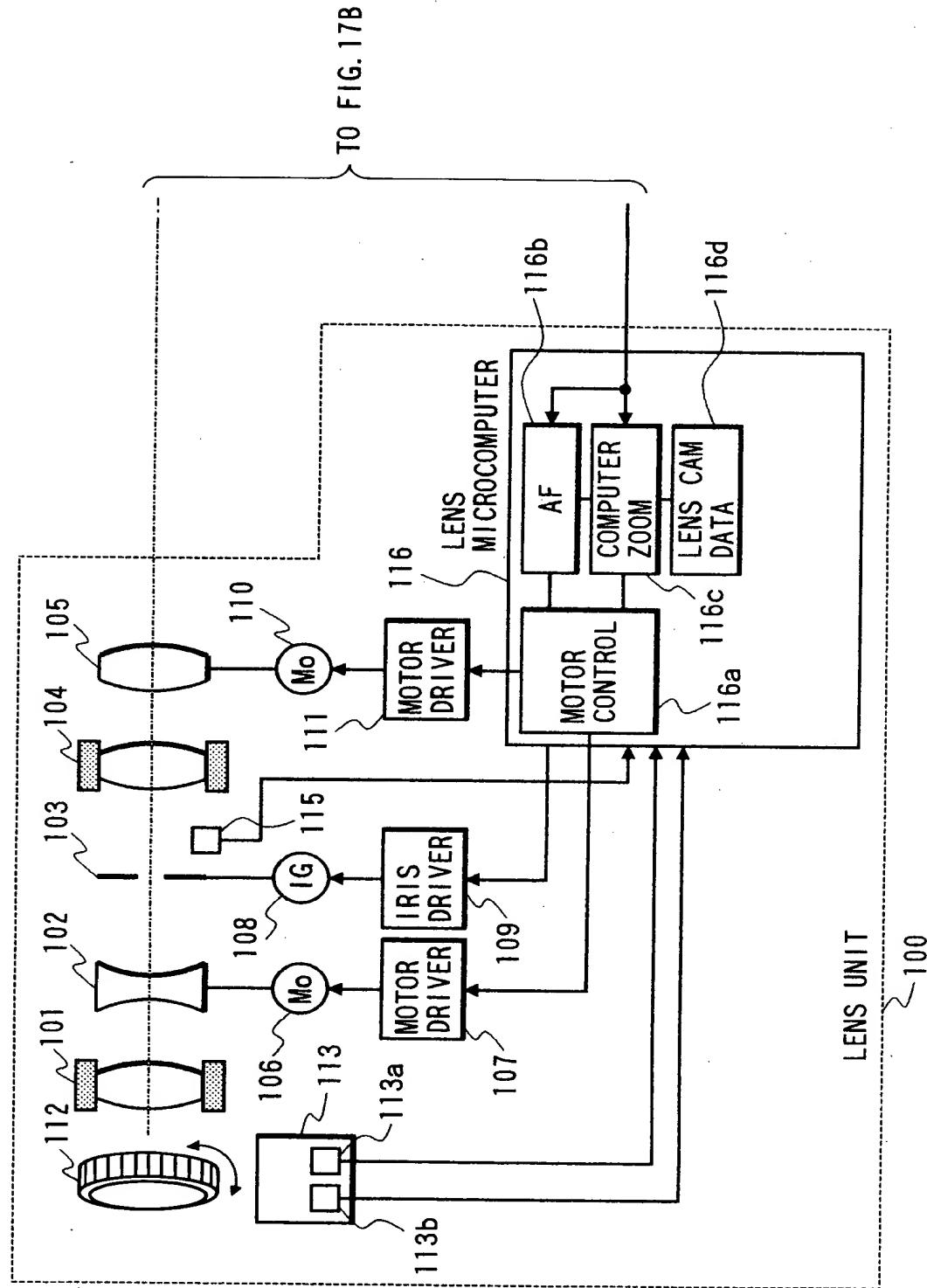
	APPROVED BY	O.G. FIG.	
		CLASS	SUBCLASS
	DRAFTSMAN		

FIG. 15A	FIG. 15B

FIG. 15A

TO FIG. 15B

LENS MICROCOMPUTER — 116

AF — 116b

COMPUTER ZOOM

LENS CAM DATA — 116d
116c

EEPROM — 116e

MOTOR CONTROL — 116a

MOTOR DRIVER — 111

Mo — 110

104 105

103

115

IG — 108

IRIS DRIVER — 109

MOTOR DRIVER — 107

Mo — 106

113a

113b

113

112 101 102

LENS UNIT — 100

FIG. 15B

FIG. 16

START — S121

COMMUNICATION — S122

ROTATION FLAG = 1 ? — S123 — NO →

YES ↓

C0 = 0 ? — S124 — NO →

YES ↓

S125 — T1 − T2 > α ? — YES →

NO ↓

$\Delta T \leftarrow T1 - T2$ — S126

$Zsp \leftarrow \dfrac{Zspmax * \Delta Tmin}{\Delta T}$

S127

RING FLAG = 1 ? — S128 — NO →

YES ↓

S140

S141 — MEMORY DATA = 0 ? — NO → S142 — MEMORY DATA = 0 ? — NO → TO S131

YES ↓ (S141)   YES ↓ (S142)

S131 — DRIVE TO WIDE SIDE   S132 — DRIVE TO TELEPHOTO SIDE

ROTATION FLAG = 0 — S136

END — S137

SW214 = STOP ? — S133 — NO →

YES ↓

SW214 = WIDE ? — S134 — NO → TO S132

YES ↓ TO S131

ZOOM STOP — S135

FIG. 17

| FIG. 17A | FIG. 17B |

FIG. 17A

TO FIG. 17B

LENS MICROCOMPUTER

116

AF — 116b

COMPUTER ZOOM

LENS CAM DATA — 116d

116c

116a

MOTOR CONTROL

MOTOR DRIVER — 111

Mo — 110

105

104

103

115

IG — 108

IRIS DRIVER — 109

102

101

112

Mo — 106

MOTOR DRIVER — 107

113

113a

113b

LENS UNIT

100

FIG. 17B

FROM
FIG. 17A

FIG. 18

FIG. 18A	FIG. 18B

FIG. 18A

TO FIG. 18B

LENS UNIT

FIG. 18B

CAMERA MAIN BODY — 200

210 — MAGNETIC RECORDING REPRODUCING DEVICE

207 — CAMERA SIGNAL PROCESSING CIRCUIT

208 — AF SIGNAL PROCESSING CIRCUIT

209

211 — CHARACTER GENERATOR

212 — LCD DISPLAY CIRCUIT

213 — LCD

214 — W, T — 215

AF ON

216 — MAIN BODY MICROCOMPUTER

216a — DATA READ-OUT PROGRAM

- MAIN BODY ZOOM KEY INFORMATION
- AF EVALUATION VALUE
- AF ON INFORMATION

201 202 204 206 205 203

FROM FIG. 18A

FIG. 19

START

S201 — ROTATION FLAG = 0 ?

NO → S203 — C0 ← C0 + 1, T2 ← TIMER VALUE

S204 — $\Delta T \leftarrow (T2 - T1)/C0$

YES

S202 — ROTATION FLAG = 1, C0 ← 0, T1 ← TIMER VALUE

S205 — 113a OUTPUT = H ?

NO → S207 — 113b OUTPUT = L ?

NO → TO S208

YES

S206 — 113b OUTPUT = L ?

NO → (to S208 path)

YES

S208 — RING TELE FLAG = 1 ?

NO → S210 — C1 ← 0, CHATTERING FLAG = 1, OFFSET ← ZOOM CURRENT POSITION

YES → S209 — C1 ← C1 + 1, CHATTERING FLAG = 0

S211 — RING TELE FLAG = 1, RING WIDE FLAG = 0

S212 — RING WIDE FLAG = 1 ?

NO → S214 — C1 ← 0, CHATTERING FLAG = 1, OFFSET ← ZOOM CURRENT POSITION

YES → S213 — C1 ← C1 + 1, CHATTERING FLAG = 0

S215 — RING WIDE FLAG = 1, RING TELE FLAG = 0

END

FIG. 20

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           ↓
S301 ──────────┌──────────────────────┐
               │    COMMUNICATION     │
               └──────────┬───────────┘
                          ↓
              ◇───────────────────────◇   NO
              <  ROTATION FLAG = 1 ?   >──────→ (A)
              ◇───────────────────────◇
               S302         │ YES
                            ↓
        NO    ◇───────────────────────◇
    ←─────────<      C0 = 0 ?          >
              ◇───────────────────────◇
         S303               │ YES
                            ↓
    S304      ◇───────────────────────◇   YES
              <    T1 − T2 > α ?       >──────→ (B)
              ◇───────────────────────◇
                            │ NO
    S305                    ↓
              ┌───────────────────────┐
              │   ΔT ← T1 − T2        │
              └───────────┬───────────┘
                          ↓
              ◇───────────────────────◇   NO
              <    SW117 = Hi ?        >──────→ (C)
              ◇───────────────────────◇
         S306               │ YES
                            ↓
    S307      ┌───────────────────────┐
              │  Zsp ← Zspmax*exp     │
              │  (1/ΔT − 1/ΔTmin)     │
              └───────────┬───────────┘
                          ↓
              ◇───────────────────────◇   YES
              <  CHATTERING FLAG = 1 ? >──────→ (B)
              ◇───────────────────────◇
         S308               │ NO
                            ↓
              ◇───────────────────────◇   NO
              <  RING WIDE FLAG = 1 ?  >──────→ (D)
              ◇───────────────────────◇
         S309               │ YES
                            ↓
    S310      ┌───────────────────────┐
              │   DRIVE TO WIDE SIDE  │
              └───────────┬───────────┘
                          ↓←──────────────── (E)
    S311      ┌───────────────────────┐
              │   ROTATION FLAG = 0   │
              └───────────┬───────────┘
                          ↓
                    ┌─────────────┐
                    │    END      │
                    └─────────────┘
```

$$Zsp \leftarrow Zspmax * exp(1/\Delta T - 1/\Delta Tmin)$$

$$\Delta T \leftarrow T1 - T2$$

FIG. 21

S322

(A) → MOVING-ON FLAG=1 ? —YES→ TO S314

NO ↓

S323 SW214 = STOP ? —NO→ S324 SW214 = WIDE ? —NO→ TO S318

YES ↓   YES ↓

(B) →   TO S310

S312

(C) ↓

$Zsp \leftarrow \dfrac{Zspmax*\Delta Tmin}{\Delta T}$

↓

S313 CHATTERING FLAG=1 ? —YES→

NO ↓

S314 RING WIDE FLAG=1 ? —YES→

NO ↓

S315 TARGET VALUE ← OFFSET $+ \dfrac{STROKE*C1}{N}$

S319 TARGET VALUE ← OFFSET $- \dfrac{STROKE*C1}{N}$

↓   ↓

S316 ZOOM CURRENT VALUE = TARGET VALUE ? —YES→ TO S325

S320 ZOOM CURRENT VALUE = TARGET VALUE ? —YES→

NO ↓   NO ↓

S317 MOVING-ON FLAG = 1

S321 MOVING-ON FLAG = 1 → TO S310

(D) →

S318 DRIVE TO TELEPHOTO SIDE

S325 MOVING-ON FLAG = 0

S326 ZOOM STOP

(E) ←

FIG. 22

| FIG. 22A | FIG. 22B |

TO FIG. 22B

FIG. 22A

LENS MICROCOMPUTER

AF PROGRAM — 116b

COMPUTER ZOOM PROGRAM

LENS CAM DATA — 116d

116

MOTOR CONTROL PROGRAM — 116a   116c

104 105

110

Mo

111 MOTOR DRIVER

103 115

IG 108

IRIS DRIVER — 109

101 102

Mo 106

MOTOR DRIVER — 107

112

113a

113b

LENS UNIT

100

FIG. 22B

CAMERA MAIN BODY 200

CAMERA SIGNAL PROCESSING CIRCUIT 207

AF SIGNAL PROCESSING CIRCUIT 208

MAGNETIC RECORDING REPRODUCING DEVICE 210

LCD DISPLAY CIRCUIT 212

CHARACTER GENERATOR 211

LCD 213

MAIN BODY MICROCOMPUTER 216

DATA READ-OUT PROGRAM 216a

· MAIN BODY ZOOM KEY INFORMATION
· AF EVALUATION VALUE
· AF ON INFORMATION
· MENU INFORMATION

RECORDING SWITCH UNIT 220

W T
215
214
AF ON

209 207 204 205 206 208 201 202 203

FROM FIG. 22A

FIG. 23

| DETECTION MODULE |
| CONTROL MODULE |

FIG. 24A

FIG. 24

FIG. 24A
FIG. 24B

START — S401

COMMUNICATION — S402

ROTATION FLAG = 1 ? — S403
→ NO

YES

C0 = 0 ? — S404
→ NO

YES

S405 — T1 − T2 > α ?
→ YES

NO — S406

$\Delta T \leftarrow T1 - T2$

ZOOM BEING DRIVED ON ? — S407
→ NO

YES — S408

START FLAG = 1 ?
→ NO

YES

C0 > N ? — S411
→ NO

YES

START FLAG = 1 — S412

SW130 = STOP ? — S422
→ YES

S423 — NO

SW130 = WIDE ?
→ NO

S424 — YES

DRIVE TO WIDE SIDE

DRIVE TO TELEPHOTO SIDE

S425

ZOOM STOP

S426

ⓐ ⓑ ⓒ ⓓ ⓔ

FIG. 24 B

(a)　(b)　(c)　(d)　(e)

$CO > M$? — S409
　NO →
YES

START FLAG = 0 — S410

$Zsp \leftarrow \dfrac{Zspmax * \Delta Tmin}{\Delta T}$ — S413

$Zsp \leftarrow \dfrac{Zspstart * \Delta Tmin}{\Delta T}$ — S414

RING FLAG = 1 ? — S415
　NO
YES

DRIVE TO WIDE SIDE — S416

DRIVE TO TELEPHOTO SIDE — S417

ZOOM STOP — S418

$C1 > \beta$? — S419
　NO
YES

ROTATION FLAG = 0 — S420

$C1 \leftarrow C1 + 1$ — S421

END — S427

FIG. 25

| FIG. 25A | FIG. 25B |

FIG. 25A

TO FIG. 25B

LENS MICROCOMPUTER 116

AF

COMPUTER ZOOM 116c

LENS CAM DATA 116d

MOTOR CONTROL 116a

IRIS CONTROL 116f

116b

105

104

103

102

101

112

110

Mo

111 MOTOR DRIVER

115

108 IG

109 IRIS DRIVER

106 Mo

107 MOTOR DRIVER

113a

113b

LENS UNIT

100

FIG. 25B

FROM
FIG. 25A

FIG. 26A

FIG. 26

FIG. 26A	FIG. 26B

TO CAMERA SIGNAL
PROCESSING CIRCUIT

207

R — A/D — 301 — 304
G — A/D — 302 — 305 — (+) S5
B — A/D — 303 — 306

307

208

AF SIGNAL
PROCESSING

AF
EVALUATION
VALUE

AF SIGNAL
PROCESSING

PHOTOMETRY
EVALUATION
VALUE

TO
FIG. 26B

S10 — 401 — WEIGHTING K1 — (+) S12

221

CENTER
PRIORITY
PHOTOMETRY

404

S11 — WEIGHTING K2 — 403

402

406

GATE
TIMING
GEN.

AE GATE
PULSE
GEN. — 405

FIG. 26B

MAIN BODY MICROCOMPUTER — 216 / 216e

FROM FIG. 26A

407 EXPOSURE CONTROL OPERATION UNIT

AGC CONTROL UNIT — 408 → TO 204, TO 205, TO 206, TO 116

ELECTRONIC SHUTTER CONTROL UNIT — 409 → TO 222

IRIS CONTROL UNIT — 410 → TO 116

411 LUT DATA CONTROL UNIT

PROGRAM MODE 1 LUT1 — 412
PROGRAM MODE 2 LUT2 — 413
PROGRAM MODE 3 LUT3 — 414
PROGRAM MODE 4 LUT4 — 415

PROGRAM MODE CHANGE SWITCH UNIT — 223
MANUAL EXPOSURE SETTING SWITCH UNIT — 224
RECORDING SWITCH UNIT — 220